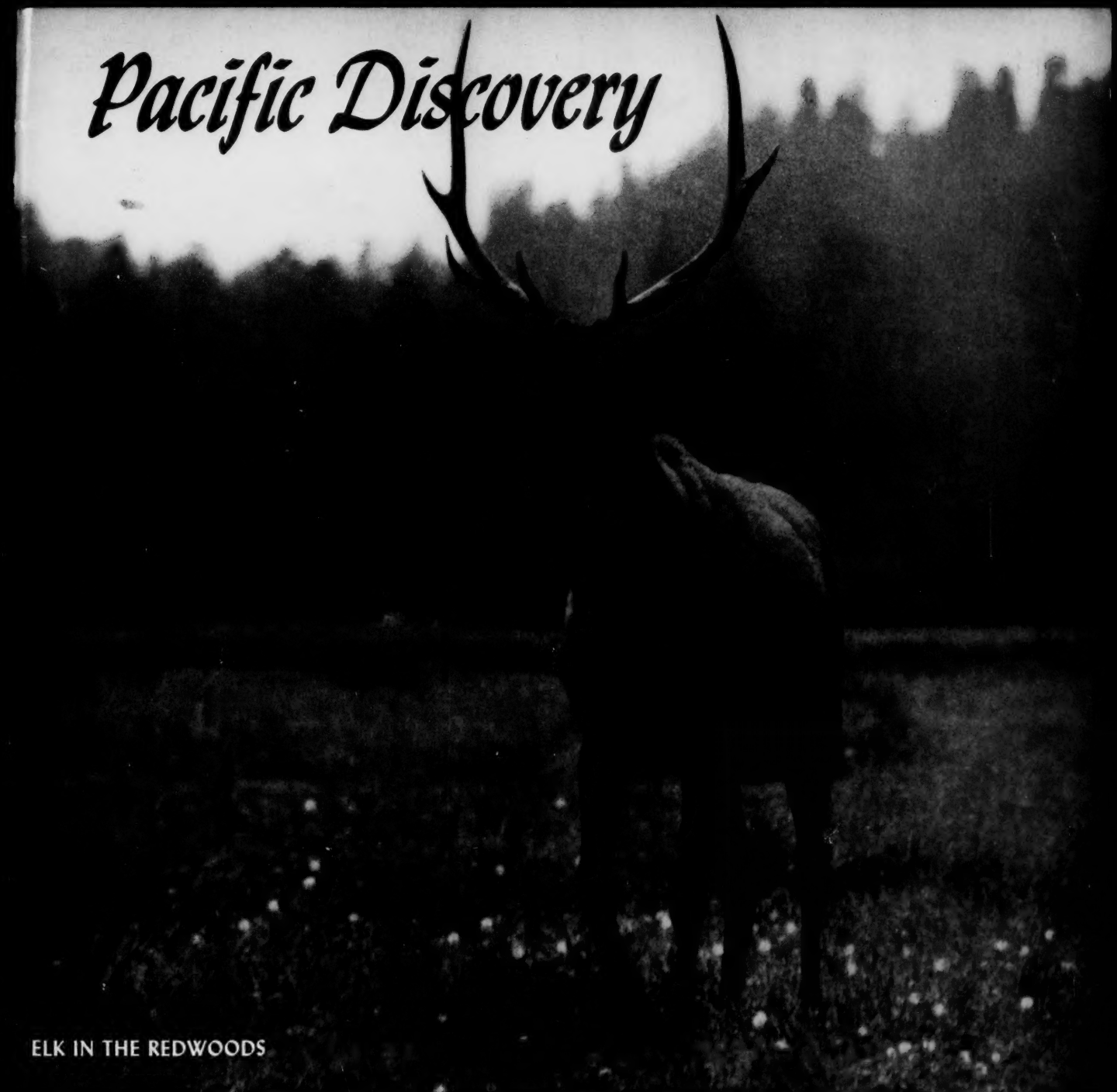
Pacific Discovery



ELK IN THE REDWOODS

PUBLISHED BI-MONTHLY BY THE CALIFORNIA ACADEMY OF SCIENCES

IN THIS ISSUE: *Paul J. Fair*

M. Woodbridge Williams & Karl W. Kenyon • *Philip Ferry*

Albert H. Banner • *Aubrey Drury*

VOLUME II • NUMBER 5

September-October 1949

FIFTY CENTS

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

THE CALIFORNIA ACADEMY OF SCIENCES

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VOLUME II • NUMBER 5 **Pacific Discovery** SEPTEMBER-OCTOBER 1949

In This Issue

Pre-Discovery

We'll not do this often—Don Simpson's tale of why "Bringing Them Back Alive Can Be Killing," announced for this issue, will appear in November-December.

When the CAS turned Research Associate Malkin loose among the insects of Africa a year and a half ago, it was with no set itinerary or "cease operations" date. From his beach-head in Tripolitania he went in with bug net in one hand, typewriter in the other, camera around his neck. From there on—across the Sahara, up and down the Gold Coast, into the Cameroons—he has reported in via cases upon cases of specimens, roll after roll of film, and air mail documents to *PD* which have to be transliterated from progressively fainter typescript. If we don't send him a new ribbon, by Cape Town we can expect something resembling the second, or rubbed-off, stage of a palimpsest. He was still legible from the Cameroons, however, and enough emulsion survived the tropics so that we can present the fourth, next issue, in a rather remarkable series of field reports of solo exploration.

"In 1834, Doña Juana Sanchez de Pacheco received from Governor Jose Figueroa a grant to a tract of land" and called it "Rancho Arroyo de las Nueces y Bolbones." Everyone who has used USGS topographic maps of once-Mexican parts of California has surely been intrigued by sonorous Spanish nomenclature letterspaced across the quadrangles, and wondered why there were such names on the land. Some have looked up meanings, perhaps to be baffled by failure to find out (e.g.) why a certain grandee—presumably *un hombre rico*—chose to call his acres the "Ranch of the Man with the Ragged Pocket." University of California Professor Ralph E. Smith's curiosity about "Las Nueces y Bolbones" turned up a story in which the splendid old native black walnuts are shown to have outlived the degenerate human tribe they got fortuitously linked with in the name of a white invader's *rancho.*

Discovering PD's Authors

Our two-time author **M. Woodbridge Williams,** aquatic biologist-photographer, and **Karl W. Kenyon,** U. S. Fish and Wildlife Service biologist now HQ-ing in Seattle, took the "*Seven Seas* to Cedros" and came back with as successful a collaboration in story and pictures as we could hope for. In fact, they pulled such an Alphonse and Gaston act over the formality of senior authorship that the final order of names is purely arbitrary. Their words and photos dovetail so perfectly that even the editors don't know whose is which except where it is safe to assume that a picture of Karl was shot by Woody, and vice versa.

Call it "Rainbow in the Canyon" or by any other poetic name, the greatest of natural bridges will, like all phenomena superlative of a class, forever challenge the man who has been there to describe his experience to everyone who hasn't. Many are honestly transported by a great natural object into sheer speechlessness, but they are not much use to those who may never get there. Then along comes a **Philip Ferry**—articulate witness—and we are richer by at least a two-dimensional report in words or pictures.

Another marine biologist got in this issue, but not as such. He is **Albert H. Banner,** now Assistant Professor of Zoölogy in the University of Hawaii. His "Reindeer Roundup" was a pre-Pearl Harbor event; he adds this footnote: ". . . We were caught on the Pribilofs by Pearl Harbor, and for quite a while we could catch almost no news on short wave from the U.S., but received very well the broadcasts beamed to us from Japan, which . . . specifically mentioned that the killing of some Japanese seal poachers on the islands around 1910 had never been avenged—but that it would be."

Probably no one knows the difficulties of "Saving the Redwoods" so well as **Aubrey Drury,** Administrative Secretary of the Save-the-Redwoods League, officer of several national conservation organizations, and President of the California Historical Society. He has done more than any one man's share of the hard, behind-the-headlines work which has kept the Redwood Highway one of the great scenic routes of the continent. Author of *California, An Intimate Guide,* Mr. Drury has another California book on the way, to be published next year by Harper.

D.G.K.

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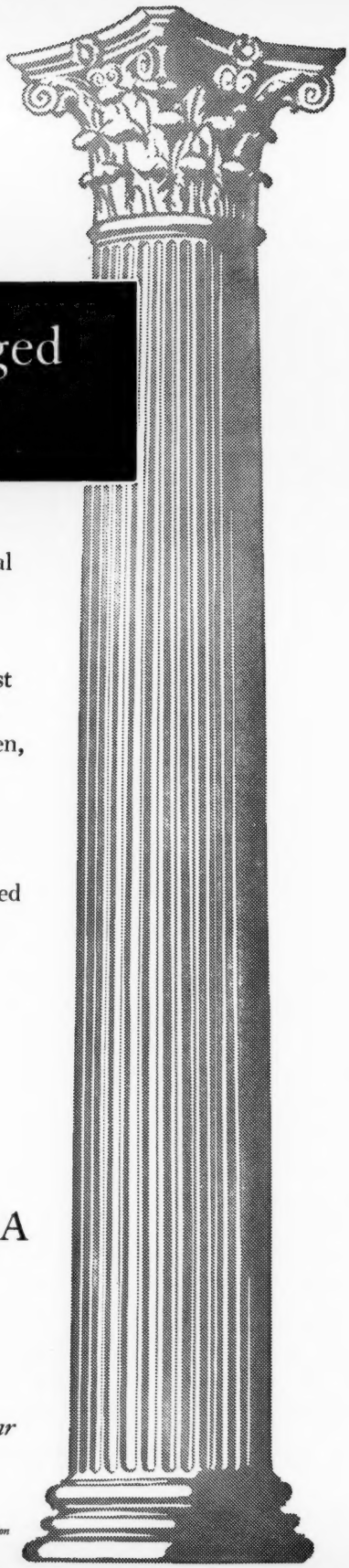

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EDITORIAL A Scientist's Loyalty

MANY EDITORIAL PAGES have had their go, by now, at this loyalty business, and much steam has been let off against investigating committees and such. We promise not to throw more coal into the firebox. A short puff might not be impertinent, however, even though the steam may be unknowingly recaptured from other editors' blasts.

In the long view, there has been no need to impose any qualifying instrument distasteful to free conscience upon a class preëminently looked to for leadership in matters of conscience, integrity, and loyalty to the ideals governing our society; and doing this runs counter to our historical way. The trust traditionally reposed in our moral and intellectual leaders—in our scientists, for instance—has not been misplaced, and there has been shown no cause to withdraw it pending individual or collective affirmations of honor.

Good faith is taken for granted in the clergy as readily as faith. Lawyers may be the butt of jokes—until they become judges, whose probity we assume. College professors may be pictured in the public eye as baggy in old tweeds, absent-minded to a comic fault, and often naïve as babes but invariably as guileless. Of these morally and intellectually select none are more favored than the scientists, who staff and direct university, government, and private laboratories and institutes of pure and applied science. These are the titans and gods of our twentieth century folklore. They enjoy a confidence and total respect accorded no other group in greater, if equal, degree.

We may hold that there is more in this esteem than the layman's childlike awe, the aura of supposed omniscience, or the acceptance of Science as new faith and its star performers as directors of destiny. We may acknowledge the core of this public regard to be everyman's adherence to an ideal of the scientist as man of honor and unshakable loyalty to truth.

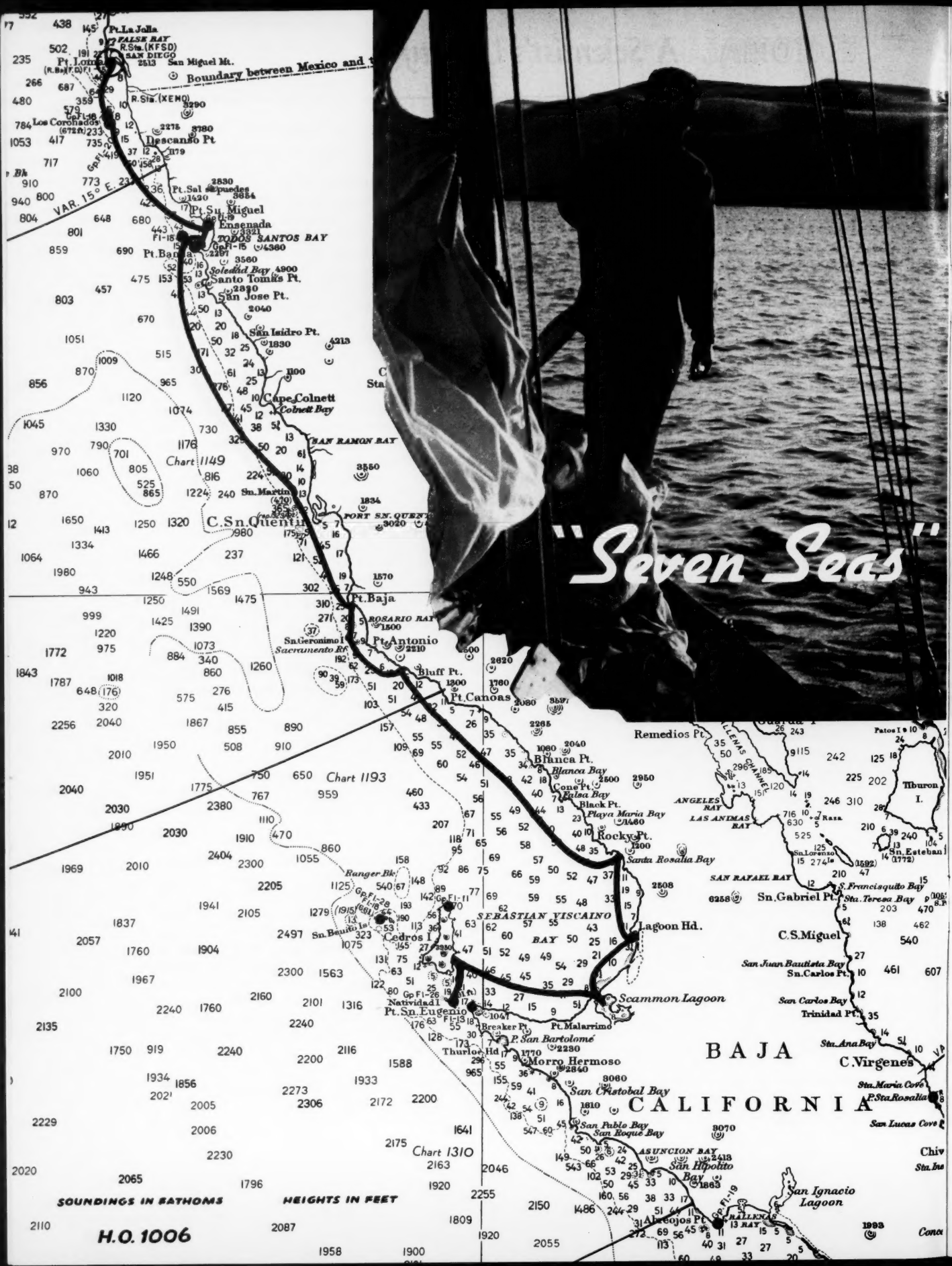
Five ideas among which we grope for the moment are part of an historical linkage rooted (but not exclusively) in Western civilization. *Integrity* (wholeness as well as honorableness); *universality* (parent-idea of universities and learned societies as centers of many branches of higher study—becoming increasingly applicable with the growing complexity of curricula and research programs); *science* (the organized body of knowledge—the things we know through experience or believe through reason to be true); *truth* ("quality, state of being true or accurate or honest or sincere or loyal . ." [*Concise Oxford Dictionary*]); and *responsibility* (moral accountability for actions, capability of rational and trustworthy conduct)—these ideas or ideals are the foundation-stone upon which our institutions of learning are built, and *upon which our faith in such institutions must rest.* Faith in an institution—a university, an academy of sciences, a research institute—must of necessity mean faith in the persons who comprise its faculty or staff. Institutions are often greater than men, but only when the men who are their life in a given time are loyal to the ideals that make both men and institutions great. A totalitarian dictatorship or other politically effective power may pervert the constituent personnel of an institution to its own political ends; so doing, it destroys the institution, which is promptly blackballed from the society of free institutions.

If an individual member of a free institution should be perverted or suborned by a false idea into becoming a ready instrument for the subversion of the institution or of society, he would not be found out by wringing declarations of loyalty to right ideas from all members in turn—subornation involves perjury. (This point has already been sufficiently labored editorially and otherwise.)

In a society based on and generally operating by the ideals we have named, the man who believes in wrong living or that two and two are five is over his own barrel. If he lives wrong flagrantly, society deals with him according to prevailing mores. If he announces in public that two and two are five, he is ignored, or put away in another kind of institution, depending on the seriousness of his condition. A healthy body heals its minor wounds; a sound institution or society argues down or gives the silent treatment to members who would shout falsehood from the rooftops.

This is the effective challenge – our society grants freedom of ideas, expression, and action, but, in turn, exacts responsibility. Behind the challenge is a spirit of give and take, a principle of ethics. If we are to hold the ideal of truth, then we need not fear the freedom of ideas. If our society is on the whole ethical—devoted to enlightenment and improvement—it will prove by open competition which ideas are true and which false. It can prove nothing in an atmosphere of suspicion, or by the spirit and methods of coercion. And if we would continue to look to our institutions of learning for leadership in advancing the ethical ideals of enlightenment and improvement, we must, in return for responsibility, give them and the intellectual leaders who comprise them, confidence—complete trust in their loyalty to our common ideals.

D.G.K.


"Seven Seas"
Pt.La Jolla
FALSE BAY
R.Sta.(KFSD)
SAN DIEGO
San Miguel Mt.
Boundary between Mexico and
R.Sta.(XEMO)
Los Coronados
Descanso Pt
Pt.Sal si Puedes
Pt.San Miguel
Ensenada
TODOS SANTOS BAY
Pt.Banda
Soledad Bay
Santo Tomás Pt.
San Jose Pt.
San Isidro Pt.
Cape Colnett
Colnett Bay
SAN RAMON BAY
Chart 1149
C.San Quentin
FORT SN. QUENTIN
Pt.Baja
ROSARIO BAY
Sn.Geronimo I.
Sacramento Rk.
Pt.Antonio
Bluff Pt.
Pt.Canoas
Remedios Pt.
Blanca Pt.
Blanca Bay
Cone Pt.
Falsa Bay
Black Pt.
Playa Maria Bay
Rocky Pt.
Santa Rosalia Bay
Chart 1193
Ranger Bk.
Sn.Benito I.
Cedros I.
SEBASTIAN VISCAINO
BAY
Lagoon Hd.
Natividad I.
Pt.San Eugenio
Breaker Pt.
Pt.Malarrimo
Scammon Lagoon
P.San Bartolomé
Thurloe Hd.
Morro Hermoso
San Cristobal Bay
San Pablo Bay
San Roque Bay
ASUNCION BAY
San Hipolito Bay
Chart 1310
Abreojos Pt.
ANGELES BAY
LAS ANIMAS BAY
SAN RAFAEL BAY
Sn.Gabriel Pt.
Sta.Teresa Bay
S.Francisquito Bay
C.S.Miguel
San Juan Bautista Bay
Sn.Carlos Pt.
San Carlos Bay
Trinidad Pt.
Sta.Ana Bay
C.Virgenes
Sta.Maria Cove
P.Sta.Rosalia
San Lucas Cove
Tiburon I.
Sn.Esteban I.
Sn.Lorenzo
BAJA
CALIFORNIA
SOUNDINGS IN FATHOMS
HEIGHTS IN FEET
H.O. 1006

The "Seven Seas" stands in toward great dunes on the south side of Sebastian Viscaino Bay, en route to Cedros Island. Scale of chart showing her track is 35 nautical miles to 1 inch.

to Cedros

Photographs by the Authors

M. WOODBRIDGE WILLIAMS & KARL W. KENYON

CERTAINLY, WE MADE A TRIP to Lower California. But we have no photos of ourselves dwarfed by giant marlin, or Zane Grey tales to tell of exploiting the virgin seas. Our story is different: it concerns a stretch of the west coast of Baja California which most pleasure craft hurriedly bypass on their way to the Gulf. We were in no position to hurry, nor to go to the Gulf of California, for that matter. Our ambitions were limited by an auxiliary sloop called the *Seven Seas,* a craft reputedly designed to fulfill the promise of her name.

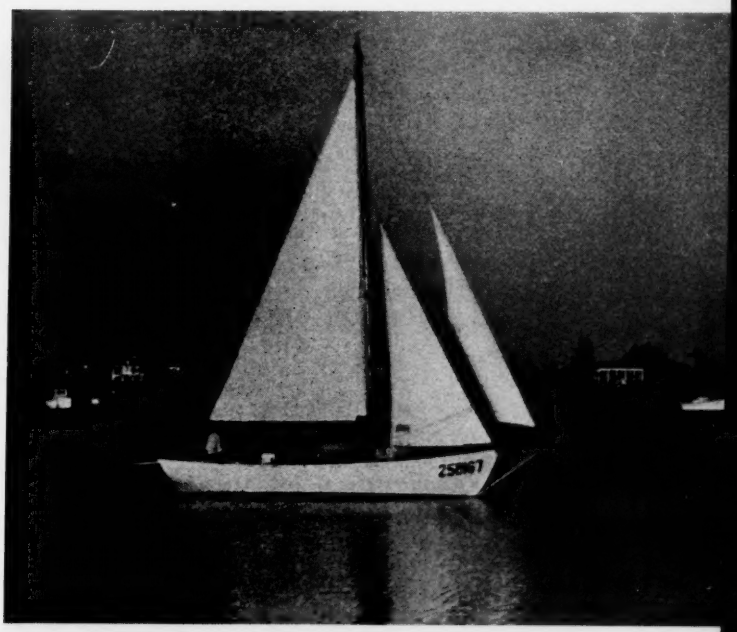
She was seaworthy all right—but the hissing combers of the open ocean looked mighty mountainous and ugly from her 23-foot deck. The 1,000-mile trip we made down Cedros Island way and back was enough for us. In fact it was too much for some of the tuna fishermen who looked down on us from their stable decks and said we were crazy.

Perhaps we were, but the trip gave us opportunities for partially fulfilling plans delayed four years by war. Both of us had long been interested in the natural history of the west coast of Baja California. After Uncle Sam turned us back into civilians, Karl bought the *Seven Seas* in order to pursue his ambition of studying, painting, and photographing the sea birds which nest in the spring on the islands and in the lagoons of the desert land below the border. Woody, on the other hand, was more concerned with the lower grades of life—the creatures that squirmed and crawled and slid over the sea bottom, or sat down on a rock and relaxed their lives out. Despite the soporific existence of these animals, collecting them required a good deal of vigorous labor on our part—pulling up dredges, or scrambling along rocky shores and turning huge boulders.

After a day's activity our small cabin would burst with specimens, notebooks, sketching pads, and cameras—to say nothing of the mixed odor of formaldehyde, droppings from some birds which Karl was painting, and the experimental stew brewing on a dilapidated Coleman stove which deposited great quantities of soot on the utensils as well as on the cook.

Our departure from San Diego in the early spring of 1946 was marked with the usual troubles that a man seasoned in sail might expect to plague two young machine age novices. We lost our punt overboard before we had cleared the harbor, right in front of the San Diego City Hall, whose glamorous hulk adorns the city's waterfront. By the time we'd cleared Point Loma the lights ashore were already twinkling in the dusk. A gentle greasy swell heaved beneath the sloop. Karl went below to rattle pots and pans in competition with the *chug, chug, chug* of our one-lunger auxiliary Wisconsin. He was not there long. His face, the synthesis of disgust and anger, appeared in the hatch.

"Something wrong?" Woody asked.



Shakedown for adventure! The sloop "Seven Seas" rides calm water out of her berth at the Coronado Yacht Club, Coronado, California, on a trial run.

"Woody, the generator's broken. Do you want to eat cold beans for two months?"

"No!" the K-ration veteran yelled.

We came about and headed back for San Diego.

A day later, the *Seven Seas* came up to Los Coronados, tiny islands just within Mexican waters and several hours sailing southwest of San Diego. California sea lions barked from the rocks a hundred yards away where a gentle surf splashed. Overhead a thousand gulls circled and added their cries to the wilderness atmosphere. The sun had just vanished beyond the sharp edge of the Pacific, silhouetting the milling gulls and rocky little North Coronado against a luminous, rose-washed sky. The *Seven Seas'* anchor chain rattled for a few seconds, then its steady tension satisfied us we were fast to the broken sea floor five fathoms below.

It was a calm little bight on the east side of the island, where the kelp grows almost up to the rocky shelf against which the surge sucks and growls, and the breeding colony of sea lions fills the air with raucous barks. Cliffs and steep talus slopes rise directly from the water, with nests of cormorants and pelicans clinging precariously to them. Karl decided that there would be good hunting with camera in the morning. For the evening, though, he lit a stogie and broke out the fishing gear.

Darkness comes rapidly in Baja California, and after a concoction of ocean whitefish, blue perch, abalone, and spuds, our only thoughts concerned the bunks. But, suddenly, high pitched notes in rapid succession came down the hatch from out of the night. They were different from those of the screaming gulls, and there was no whirring of cormorant wings.

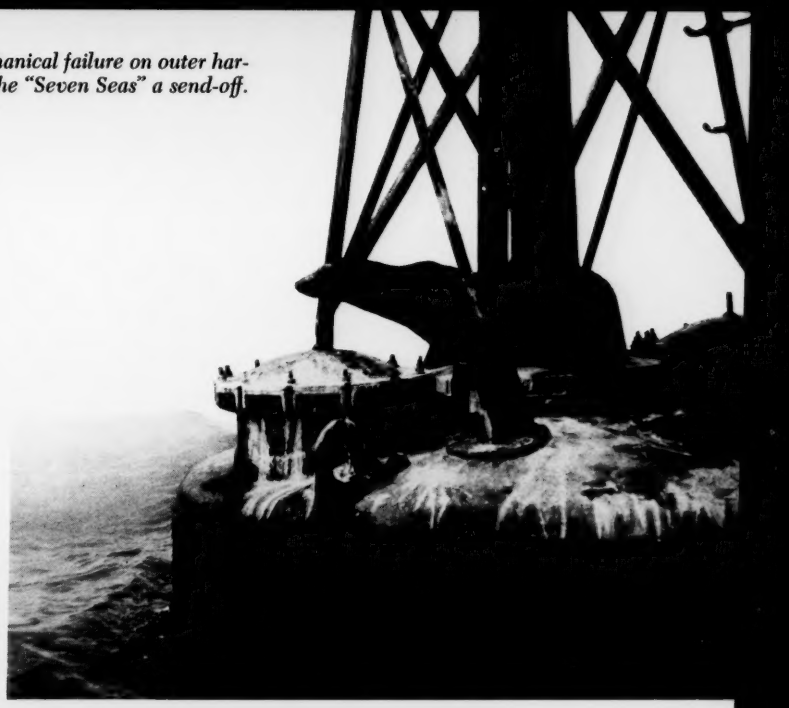
Karl listened for a moment. "Night flying birds looking for their nest burrows," he said.

We went on deck to hear better and to check the anchor lines. There was considerable sea lion talk and splashing around the sloop as she lay quietly in the black night. All about the craft paths of soft luminescent light zigzagged through the water, like streaks of glowing star dust. This was a different cosmos, though – Milky Ways in a denser medium, flashing on and off as sea lions in pursuit of fish, or playing beneath the boat, disturbed countless minute organisms suspended in the sea.

The dawn with gull and sea lion sounds soon snapped a new day into existence and we went ashore. Woody began turning over rocks and quickly disappeared within a nearly vertical ra-

California sea lion takes the deep six off North Coronado Island.

A big old bull California sea lion of North Coronado Island bellows a warning to intruders.



Foghorn. Cow sea lion stands by in case of mechanical failure on outer harbor buoy, San Diego. Well, anyway, she gave the "Seven Seas" a send-off.

vine from which could be heard frequent exclamations of satisfaction, as he began to remove the island, rock by rock, in search of desert land shells.

Karl climbed to the razor-sharp crest of North Coronado. The western gulls dived and voiced noisy protests, guarding the dozens of earth-formed cups soon to hold their olive colored, spotted eggs. Even now, March 27, the California brown pelicans had eggs hatching. Their bulky nests of sticks crowded certain of the island's upper slopes. Karl counted 155 and probably missed others. He missed them because he knew that if he walked among the nests the agile and carnivorous gulls would descend and gulp down the pelican eggs and newly hatched chicks before

their shyer and clumsier owners could return to cover them.

As Karl moved quietly along the ridge, observing the nesting sea birds, Coronado Island song sparrows trilled morning lays from the tops of low thorny thickets, and a barn owl flushed from a cavern in the rocks. When Karl explored this roost he found black feathers scattered there in profusion. Many pellets held the remains of members of the local race of whitefooted mice, but apparently the owl also had an appetite for the little black petrels that scramble among the rocks at night to find their nest burrows. Above the wheeling gulls a duck hawk circled and uttered its monotonous high-pitched cry. On a sandstone ledge, from which its mate flew, Karl found eggs nearly ready to hatch.

Finally the two browsing naturalists joined forces on top of the island and looked almost straight down to a tiny white speck that was the *Seven Seas* anchored just outside the kelp, and to groups of sea lions spotted along the water's edge. From this herd John Zolezzi, professional sea lion hunter, captures many animals, which are subsequently trained for zoos and circuses. Since they are wary of human intruders and dash for water if approached on land, the hunter captures them in nets placed by boat in the water just beyond the rocks. After the nets are laid a volley of shot, fired over the restless lions, frightens them into the water, where they become entangled in the nets, to be hauled aboard and later shipped to animal trainers.

Most of our catch, though, was of a somewhat different nature. Woody's knapsack bulged with snuff boxes full of land snails, salamanders, and lizards, while Karl had a good batch of bird photographs to launch the expedition on an excellent start.

Wind whined in the rigging and spray wet us through long before sunrise next morning. The sea lions coughed and barked from the beach, and the jagged shore gave off a phosphorescent glow through the darkness where a band of foaming breakers pounded on the rocks. We motored into

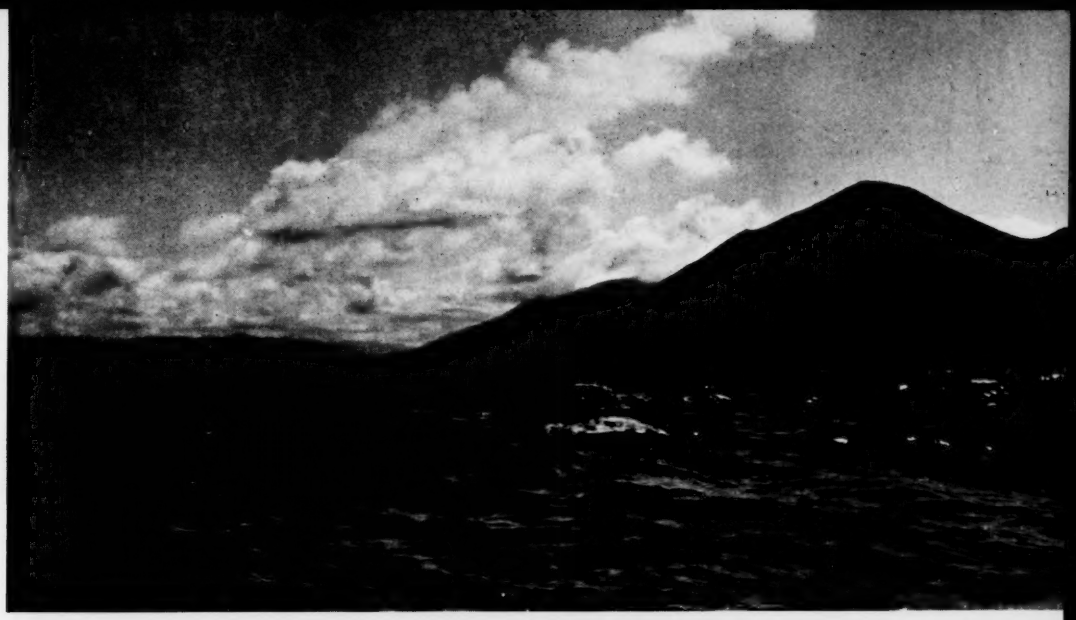
the heavy chop and hoisted our anchor—and then our troubles began to assemble.

A calm day and evening had made us careless. Our gear was not properly secured. A rising wind brought rain squalls with accompanying gusts. The tossing sea washed valuable equipment overboard. Our two jibs, their halyards fouled, trailed alongside, weighted with water, as white caps broke over the bow. Long after daylight, saturated with sea water, we finally untangled the mess and headed south for Ensenada. As we left South Coronado astern the sky cleared and the little storm passed on.

Papers, red tape, reorganizing the rigging, and another storm held us in Ensenada Bay for four days. While at Ensenada, where we cleared Mexican customs, we had just returned from the office of the yacht broker, Salazar, in the sardine cannery, when our anchor line parted at the water line. For more than a day the anchorage had been made uncomfortable by a heavy ground swell and sea blown up by a southwester. We had been tossed about like a ping-pong ball riding on a water spout. When we saw ourselves starting toward the breakers, we got up sail and scudded across Todos Santos Bay to the anchorage in the lee of Punta Banda where huddled a group of purse seiners riding out the blow in quiet water.

We lost a day behind this graceful headland over which the soft fog banks poured in the evening, their edges gold tinged from a setting sun. But the delay had its compensations. It was here we met Pancho. He was the lone skipper and crew of the Mexican fishing boat *Petrel* that lay near us while we waited out the storm. We were anchored under Punta Banda's red cliffs on the south side of the bay. Pancho had long experience of Baja California waters, and he passed on valuable information about anchorages and dangerous places along the coast. He was kindhearted to begin with, but after a few donations from our supply of bottled goods he jumped at the chance to help us and sold us his spare anchor for five dollars to replace ours lost at Ensenada. No sooner had the five dollars vanished into his pocket than Pancho developed urgent business in Ensenada, and the *Petrel* vanished in the distance.

The glow of sunrise over a misty sea and the



Punta Banda, at the entrance to Todos Santos Bay. The "Seven Seas" took refuge behind this peninsula during a blow which almost wrecked the sloop at Ensenada.

distant shape of San Martín Island's twin volcanic cones created a happy scene for us after running all night before a 30-knot gale that swept us down from Punta Banda on the crests of foaming combers. Partly because of our inexperience in handling sail, we jibed four times in the night, but even a seasoned salt, we believe, would have had his hands full. Down in the troughs the wind would catch behind the sail, slam it to the starboard side, and in so doing threaten to dismast us. When off watch, we were thrown from our bunks several times by the violent motion of the sloop. Finally we slept on the floorboards wedged in the narrow passageway through the tiny cabin.

Nearly exhausted from the long hours at the tiller, we pulled in behind the boulder hook, a natural breakwater, that makes Hassler Cove on the east side of the island such a pleasant anchorage. Riding safely in this quiet water behind San Martín, it seemed unbelievable that only a few hours before we had tossed in darkness on a violent sea with howling winds and driving spray soaking us. It seemed that the rising sun had created a whole new shining world from the depths of a raging chaos.

Camped on the sandy beach at the foot of a cactus covered lava slope were half a dozen Mexican seaweed gatherers. Equipped with several skiffs, a diving suit patched like an ancient tire tube, an air pump, and a supply of food and water, the men are left isolated here for weeks at a stretch to gather the reddish marine alga of the genus *Gelidium* from the sub-litoral areas where it carpets the bottom. This seaweed is the source of agar used principally by bacteriologists as a culture medium. The diver goes out to the beds in a large *pongo* propelled with long sweeps. In the evening the craft will return loaded with gunny sacks of wet weed which is taken ashore, spread out on the beach and dried, then baled and shipped to San Diego for refining. Some of the purest agar in the country is produced there—the industry having supplanted the pre-war Japanese monopoly.

Our first thought in Hassler Cove, even before exploring our new surroundings, was to dry out. The deluges of water that had come aboard during the previous night had drenched everything. The cabin was a disorganized tangle of clothes, canned goods, books, and camera equipment. Only the dozens of beach flies that had come aboard at Ensenada seemed unaffected. They buzzed happily from every crack, apparently ready for business as usual. While we spread our possessions out on the sunny deck a stream of birds passed over us, flying to and from their nesting colonies on the island. Strings of cormorants and pelicans moved in formation across the bay and disappeared beyond the island's cinder cones. Later we found that their colonies covered much of San Martín's western slope.

Most interesting to us were several ospreys that plunged for fish into a kelp bed near us. These long-winged fish hawks have nearly disappeared from their former haunts along the California coast and islands to the north. Even here on San Martín, more than 150 miles south of the border, this bird has become greatly reduced in the past thirty or forty years. Where we found three pairs nesting, visitors to the island early in this century

From the heights of North Coronado we looked down on our tiny sloop—she was dwarfed by the substantial looking vessel riding to seaward.

Parent osprey returning to its nest —Scammon Lagoon. (ED. NOTE: *This is one of a series of remarkable osprey pictures Karl Kenyon took from a blind. More will appear with Part II in a later issue.)*

had counted thirty or more. As we traveled southward and visited bays and islands more remote, less frequented by fishermen, we found the birds more numerous. In Scammon Lagoon, which because of its treacherous entrance is seldom visited, we found several small sandy islets that supported sizable osprey colonies. Here on San Martín they placed their bulky nests on broken lava slopes. On Cedros Island we saw them on the rock ledges of sheer cliffs while in Scammon Lagoon they built their heavy platforms of sticks on the sandy beach, or simply lined a depression in the sand with a few strands of seaweed.

The osprey is quite fearless of man, and since it lives exclusively on fish that it takes by plunging from the air, it is often in the vicinity of fishing boats. Thoughtless fishermen frequently shoot at the birds or at their large nests. This may explain why the bird is not as numerous today as in years past if its home happens to be near good fishing grounds. The eggs must be incubated for four weeks, and the young then remain in the nest for another two months. Thus the birds present a tempting target to passers-by over a long period of time.

Karl became much excited when he spotted a yellow-crowned night heron foraging along the shores of Hassler Cove among the large volcanic boulders that stretch out from the island in a tumbled heap. For the bird was far north of its customary haunts in the southern part of Baja California. He took the bird for a specimen and found later that this was a new northern record.

There were on the island other examples of wanderers off their course, such as the wreck of the *Quest* which had been thrown high upon the boulder beach at the north end of San Martín. We were told later that she hit the island at full speed ahead in a dense fog while going south for a load of clams. Strewn all along this desolate outer coast of Baja California we saw other remnants of once hopeful fishing enterprises, the identities of many having been lost in the drifting sands of the beaches. Even offshore the wrecks of ships occasionally appear stark above the sea, such as the driving rod of the old side-wheeler *Sacramento* that protrudes above the reef bearing her name below San Geronimo Island. As this is written our file contains reports of last year's disasters on this dangerous, unlighted coast. A war surplus YMS on its way to the Caribbean—aground on San Martín; a chartered fishing vessel lost on San Geronimo with the cook missing. We wondered how

Going south for a load of clams, the "Quest" hit San Martín Island at full speed ahead.

Rosario dozes in a wide fertile valley a few miles back from the sea. It is the site of an early Spanish mission which is still partly standing.

many more makeshift crosses would join those already scattered along the coast on the tiny islands, such as the Japanese grave on San Martín, back of the Mexican seaweed camp.

After we left San Martín, heavy winds and seas drove us to take shelter in the lee of Punta Baja, a day's sail to the south and near the old Dominican settlement of Rosario which drowses in a well watered stream valley a few miles back of the beach. The inhabitants claimed that the wind blew steadily through April and May. From our experience of the past two weeks this statement certainly was no exaggeration.

It was the continuous wettings and cold winds which often made us query our decision to leave home, especially after both of us had so recently knocked about the world in human sardine cans, such as the cockpit of a Navy Hellcat, or the holds of Army transports. Karl would sometimes remark that he wondered why he was doing this and paying for it too. But such sights as he reported one morning at Punta Baja may partially explain the real reasons for the undertaking.

In the spring of the year Pacific loons gather in large, loose flocks of several hundred in preparation for their northward migration. Karl was on deck this day to try to catch sight of the yellow bluffs as we lay in the lee of the point waiting for the fog to clear. Near the water it was thick, and he could see only about 200 feet. Straight above, blue sky was clearly visible and the slanting rays of the morning sun created a ghostly rainbow that shone as a nearly colorless but brightly luminous ring against the dead white fog behind it. As he gazed at this wilderness phantom and listened to the sound of distant breakers, it suddenly seemed to Karl that the air had been filled with a charge from a giant shotgun. A flock of loons burst from the wall of whiteness around and through the strange ghostly rainbow; with surprised squawks, necks askew, they careened and veered to miss the *Seven Seas*' rigging. Then, as suddenly as they had appeared, they were gone in the blank wall of whiteness.

When the cliffs became visible, we were surprised to see a coupe drive out onto the point. A pair got out, descended to the rocky beach, and began to scramble among the rocks in a somewhat professional manner, which suggested to the naturalists on the sloop that some compatriots were on shore, and that their territory was perhaps not so virgin, after all.

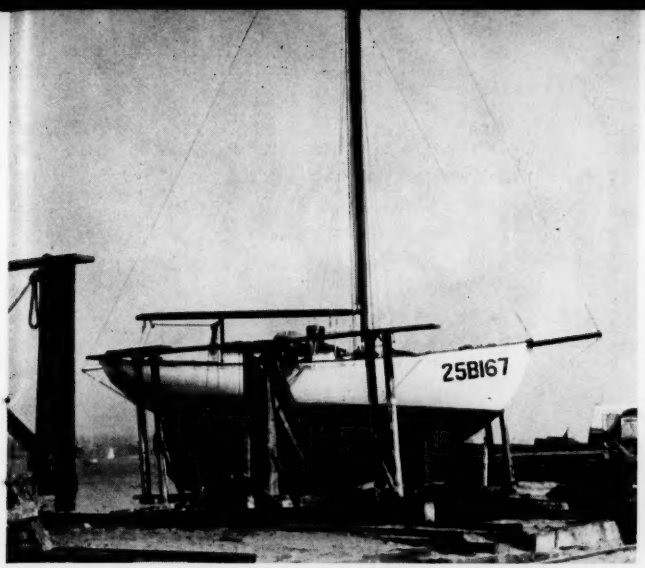
Our curiosity led us to launch our punt, the *Pootwaddle,* and go ashore. There we found a gentleman named Yale Dawson, from the Allan Hancock Foundation, and his young sidekick from San Diego, of high school age. They were collecting algae. This was also our introduction to a phenomenon.

After a day's collecting the work really begins. Kenyon prepares skins in the cockpit. The bird in his hands is an osprey.

It seemed that the point supported a rather interesting northern flora, whose presence was due to the cold upwelling of water along the coast. Dawson said that the surface temperature was 15° centigrade; this was in the latitude of New Orleans and Jacksonville. We also found several other of these cold spots along the coast, and they contained a fauna more typical of Monterey than of southern California. These cold upwellings no doubt create a bug in the hair of those zoögeographers who attempt to depict the distribution of marine animals on the coast as if it were a matter of latitude alone. But the correlation between temperature of the water and the characteristics of the fauna and flora inhabiting Punta Baja was neither the beginning nor the end in this interesting sequence of cause and effect. For although 15°C. may be optimum for luxuriant growths of California mussels, and the sycon sponge of the coast, *Rabidomella,* it produced clammy fogs propelled by chill winds which certainly are factors limiting the abundance of a California species of the genus *Homo* which flourishes in a more expanded state in, say, the Cove at La Jolla, or on the beach at Santa Cruz. Here at Punta Baja a few migratory stragglers of the species are occasionally collected, but always taken completely contracted under layers of blankers, sweaters, and pea jackets!

Still, this is not all.

Oceanographers have taken care of the beginnings of this interesting phenomenon. They link the northwesters, such as had tossed us about for the last two weeks, with the origin of the upwelling. They will explain—if they care to oversimplify, which they probably won't—that these winds have a tendency to set up currents which pull water away from the shoreline. This is replenished by other water coming to the surface from the colder depths. The theory is strengthened by the good correlation between periods of the northerly winds and the period of upwelling, both of which occur on the California coast from March to July. In the regions of these upwellings, cold as they may be, there is usually an abundance of marine life, owing, perhaps, to the comparatively high concentrations of nutrients in upwelled waters.



The 23-foot sloop "Seven Seas" was a vessel of deep draft. She needed all that keel to give her stability in heavy seas, but Woody and Karl would have given a lot to have converted her to a flat bottom in Scammon Lagoon–but that story belongs to the next chapter!

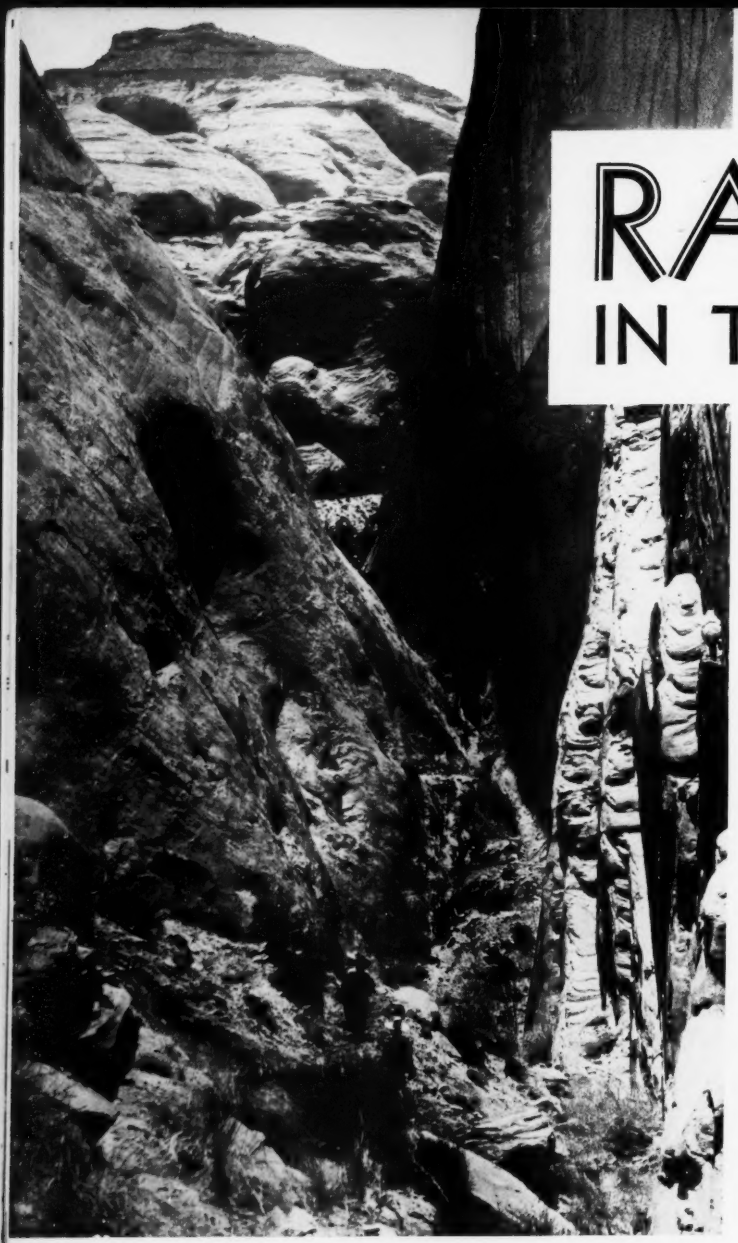
For this reason, Woody had been extremely busy at low tide on Punta Baja, and as he was cook for the evening–we took turns as cook–he decided to try a new dish for dinner.

All afternoon he had gathered sea snails, and some shells with hermit crabs, the whole lot of which he boiled for cleaning. Thinking that the broth should have a tasty flavor, he proceeded to cook the potatoes in it. Unfortunately the combination of snail and crab juice and bits of algae was anything but pleasing–we agreed it was strictly not for future use. And although the entire experiment was another cause and effect sequence stemming from upwelling off Punta Baja, it did not as an innovation in cuisine quite approach that state of turbulence in Karl's stomach. He quickly forgot the incident by chewing down a cigar, and catching a mess of spoffin croaker from the cockpit of the *Seven Seas*. Nowhere did we find such excellent fishing for this delectable sport fish as here on the sand bottom of Rosario Bay behind Punta Baja.

Results of less transitory nature were also obtained here. Woody got a fine collection of desert land snails, *Micrarionta*, from the bluffs back of the beach where they lived beneath xerophytic shrubs which were briefly in bloom before relapsing into a dried, semi-lifeless state for the remainder of the year. Also beneath a desert member of the snapdragon family we collected a legless lizard that proved to be a new addition to the mainland fauna; the subspecies was formerly known only from little San Geronimo Island about nine miles southwest of Punta Baja.

(To be continued)

The skipper takes over. Kenyon at the helm, the "Pootwaddle" lashed alongside.



RAINBOW IN THE CANYON

PHILIP FERRY

Red Bud Pass. The trail to Rainbow Bridge winds through a series of narrow canyons flanked by lofty mesas. (James H. Barbour)

WHEN WE, SEVEN CALIFORNIANS, signed the visitors' register at Rainbow Bridge National Monument, one sunny April day, we did so with the smugness of those who are aware they are members of a small coterie. Fewer than 5,000 persons have signed the register since it was placed beneath the arch of Rainbow Bridge in 1909, the year white men first saw the great rainbow of stone in southern Utah.

Among the signers have been Zane Grey, Irvin S. Cobb, and Theodore Roosevelt. Grey was so fascinated with the country that he returned there time and again and used nearby Wild Horse Mesa as the locale of one of his better known Western yarns. Cobb, too, must have been impressed; his daughter, in a biography of her late, famous parent, devoted an entire chapter to a description of the humorist's visit to Rainbow Bridge some years before his death. Cobb, Grey, and Roosevelt have all passed on, but a few more become initiated each year as visitors make their way into Bridge Canyon. Famous or unknown, they form an enthusiastic legion which finds in the Rainbow Bridge country the epitome of the Southwest.

Rainbow Lodge, which serves the Monument, stands at the base of 10,416-foot Navajo Mountain, and all but straddles the Utah-Arizona state line. This is one of the wildest sections of the United States. It is two hundred miles north and east of the Grand Canyon and an equal distance from any railroad. To reach the Monument from Grand Canyon or from Flagstaff, Arizona, one must motor to Cameron, Arizona, then on to Tuba City, thence northward on the Kayenta road, and finally over a rough spur to Rainbow Lodge. Prospective visitors should write to Bill Wilson (proprietor of the lodge), Tonalea, Arizona, or to the Superintendent of Navajo National Monument, Tonalea, Arizona, who is the Park Service officer in charge of both national monuments. Rainbow Lodge provides a three-day, all-expense trail trip to the bridge and the Colorado River and return (or a two-day trip to the bridge only). This includes saddle horse and pack animal, meals, and guide service—the guide being also wrangler and camp cook. The bridge in Utah is only fourteen miles from the lodge in Arizona, but the country is

No place to rest! The weary hiker can lean against a rock or lie down on prickly pear. Author to the right. (James H. Barbour)

as rugged as it is exciting, and without a guide one could quickly get lost in the maze of side canyons which thread the region.

Our guide was a true western wrangler with the customary pungent vocabulary of that picturesque fraternity. Following in his wake, we took a well defined trail that cut across a series of rugged canyons where the very soil underfoot glowed with the pastel tints of gray, rose-red, and lavender so characteristic of the mesa country. The contrast of the deep green of the junipers with the ruddy hues of the canyon walls had the color photographers starry-eyed with delight. At a distance of perhaps five miles from the lodge, the trail took off downhill on a series of sharp switchbacks that dropped away 2,000 feet to the floor of Indian Canyon, an area enclosed by stupendous rock walls. After this descent, we stopped to eat lunch at a spot called First Water.

The trail now began a winding course through a series of five major canyons named, successively, Indian, Horse, Red Bud, Cliff, and Bridge canyons, each making a natural transition into the next. Their perpendicular walls rose hundreds of feet overhead and were weather-carved into curious formations, often pitted with caves or deeply undercut by the action of stream water. Here the imagination ran wild identifying the various rock statuary carved into the sandstone walls by the elements. Cliff Canyon has a preponderance of rounded rock forms whose similarity to gigantic stone elephants is so striking the place has been nicknamed Jumboland. Here in the lower canyon country the trail leveled out for the first time and we welcomed easier going. This was broken only by Red Bud Pass, a narrow slit between high sandstone walls where the trail scrambles up one side and down the other of a massive heap of rubble. In the canyon bottom water was plentiful, with a stream always near at hand. One stream we crossed and recrossed seventeen times.

We saw little of our guide that day. Since we took the trip leisurely in order to devote more time to photography, he kept well in advance, leaving us pretty much to our own devices. At times the trail disappeared altogether and we made our way uncertainly over gravelly creek bottoms and in and out of a confusion of stream-borne boulders where our only guide was an occasional horse track in the sand or an infrequent rock cairn. Countless side canyons, many of them showing little evidence of human visitation, formed a veritable labyrinth that kept us searching for obscure trail markings.

The difficulties of the trail in no way diminished our interest in the surrounding scenery. All of our advance information had stressed the absorbing beauty of the bridge itself, leaving us totally unprepared for the dramatic quality of the canyons through which the trail winds. If the bridge had proved a complete disappointment, the great beauty of the canyons would have compensated

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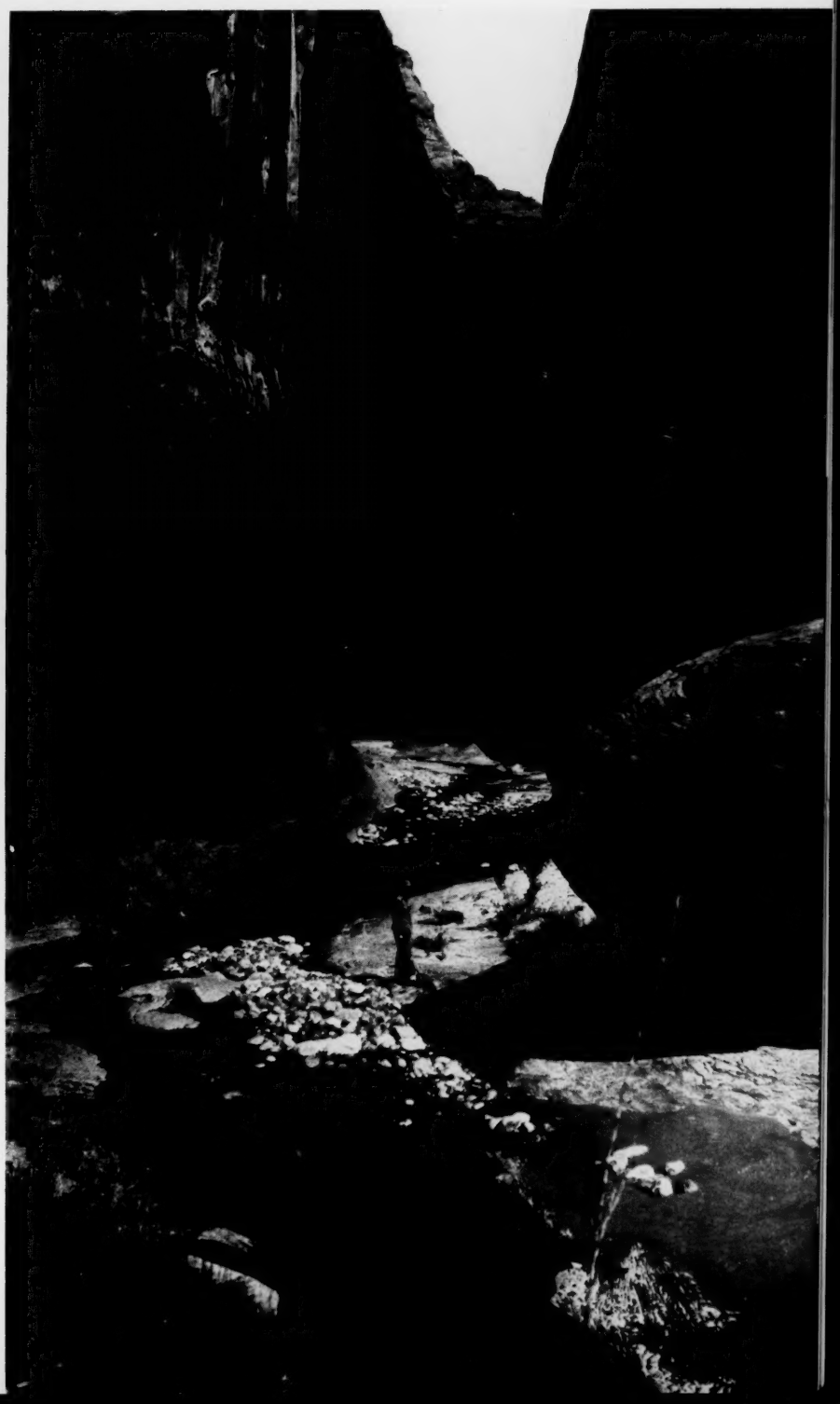
Rainbow Bridge as it sweeps into view from upstream. (National Park Service photograph)



The Narrows, through which Bridge Creek passes on its way to meet the Colorado. (James H. Barbour)

us manyfold. In the lower canyon country we heard for the first time the song of the canyon wren, a sparkling serenade consisting of a dozen liquid notes running rhythmically down the scale and repeated at frequent intervals. Perched in a

Navajo girl weaver by the Rainbow Bridge trail. The rug she is weaving is small and coarse, but the largest and finest Navajo rugs come from the same primitive type of loom. The best weavers become well known by name in the Southwest. (Katherine B. Crisp)

cranny high on a canyon wall, the sweet singer—one or another of his species—was a constant companion whose cheery carol, a haunting melody that lingers in the memory, reverberated brilliantly through the stillness.

Six hours on the trail brought us at last to Bridge Canyon, through whose lower reaches we caught our first glimpse of Rainbow Bridge, its rose-colored crescent arching Bridge Creek. The stream is small but, with the aid of the elements and untold eons of time, it has carved the bridge out of the red Navajo sandstone. Our first reaction was one of amazement at the bridge's stupendous size. From creek bottom to crest of arch, the mass towers more than three hundred feet; it is nearly as wide at the base.

It is not because of its color that Rainbow Bridge is so called, but because of that rainbow-shaped arch. Unlike most natural bridges, this greatest of them is not a mere hole-in-the-wall but a true bridge standing free of extraneous support. Each base of the arch is a tapering, heavy-bottomed mass which serves to counterweight the great bulk and keep it from bearing too heavily on the center. In addition, the left flank is bolstered by a rock mass which acts as a sort of flying buttress strengthening the structure. Rainbow Bridge is called the greatest of all natural arches. Were it man-made, it would constitute an architectural undertaking of daring conception and masterful execution. Man could hardly have devised a more suitable design for the sweeping structure than nature has created here by merest chance.

In deference to an old Navajo superstition against walking under the bridge, we walked around it before passing through the arch for the first time. To stand directly below and look up at the great arc is to be almost overwhelmed by its magnitude. Yet this huge mass has a symmetry of form and a delicacy of balance which endow it with a quality that is almost ethereal. Surrounded with silent stone peaks and hidden away in a deep canyon miles from human habitation, it called to my imagination some massive cathedral abandoned by a now forgotten people and brought to light by a lucky explorer. Before crawling into our sleeping bags for the night we strolled over for another look. Moonlight cast a softening glow over the structure, intensifying the air of unreality, even while bringing into yet sharper relief the magnificent lines of the arc.

We spent two and a half days at the bridge, photographing it and exploring the country downstream. Like that we had come through upstream, this is all deep canyon country. Everywhere and at all times one is conscious of being dwarfed by the towering red walls.

One day we spent making the 12-mile round trip through the Narrows—where the canyon walls close to within a few feet of each other—to the Colorado River. Here at the junction of Bridge Creek and the Colorado is the spot where that doughty Southwestern river boatman, Norman Nevills,* lands his passengers to walk in for a view of Rainbow Bridge.

All these days we were sustained by the ingenious meals our packer-guide prepared, which consisted mainly of mulligan stew and biscuits baked cowboy-style in a Dutch oven over an open fire.

*While this was being set in type, word came from Mexican Hat, Utah, that Norman Nevills and his wife were killed in the crash of their own plane.

Viewed from downstream, the Rainbow Bridge looks like a gigantic flying buttress. From the top of 10,416-foot Navajo Mountain in the far background one can pick out the bridge with binoculars. (National Park Service photograph)

On the morning of the third day we turned our animals regretfully homeward. The return trip would be made in two stages, because of the formidable nature of the terrain. Fourteen miles of difficult trail covered in a generally *down* direction is one thing; the same mileage retraced going up is quite another matter. Consequently we covered only five and a half miles that day and camped for the night at a small meadow made picturesque by a group of abandoned Navajo hogans standing beside a running stream.

After the packer had hobbled the animals for the night, he led us across the canyon where he pointed out an interesting display of Indian petrographs and petroglyphs on the flat canyon wall. We were amused by his nomenclature for these crude art forms of a vanished people. The petroglyphs—designs cut into the wall with a blunt instrument, in contrast to petrographs which are painted on the surface with pigments—he called "pecked-o-glyphs" because they had been "pecked" into the wall, as he put it.

We had a cheery campfire that night, with hot chocolate and cookies and a program of Western songs by Dave Stearns, our singing photographer. When we offered the packer a mug of chocolate he declined, saying, "Chocolate always gives me the nightmare—I don't want to spend the night fighting Mexicans!" While it amused us, this remark left everyone completely mystified.

Soon after sunrise the next morning we tackled the remaining eight and a half miles of trail, including the wearing 2,000-foot flight of switchbacks which forms the most difficult part of the climb back. The climb from Rainbow Bridge to the lodge, where the elevation is 6,400 feet, represents a rise of nearly three thousand feet.

Back at the lodge, we put away a gargantuan meal. Between mouthfuls we agreed that for sheer natural beauty and unspoiled terrain, the Rainbow Trail offers a greater variety of scenic fare than any other trail we ever traversed. As for Rainbow Bridge itself, Anson Burleigh, generally the most taciturn member of the party, expressed it in the fewest words:

"Speaking for myself," he declared, "I can say without reservation that Rainbow Bridge is the most *impressive* natural object I have even seen."

This statement accurately summed up the sentiments of all seven.

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Reindeer Roundup

ALBERT H. BANNER

REINDEER MEAT WAS NEEDED FOR THE WINTER ON St. Paul Island in the Pribilofs, and yet, with over a thousand head of reindeer roaming wild over the little island in the Bering Sea, none could be caught. The United States Government, owner of the island and employer of the natives, had sent only enough meat for the winter's food supply to supplement the reindeer diet. Paradoxically, if a large number of the reindeer were not caught and killed they would die of starvation over the winter, for there was not enough forage on the island to sustain so large a herd when the grass was not growing.

The government agent on the island explained the matter to us. We were two biologists—Ford Wilke and I—who had been sent up by the U. S. Fish and Wildlife Service to conduct field studies on the multimillion-dollar herd of fur seals. Rounding up reindeer was not exactly in line with our official duties, but as we had instructions to coöperate with the agent in things biological, and as rounding up reindeer sounded interesting, we were willing to do what we could.

The agent explained that in previous years the herd was still tame enough to be driven into the huge corral built for it, but that each year the reindeer had become more wary. Finally in this year, while they had been driven into the corral several times, the frightened deer had charged back out before the wide entrance could be closed. If the deer could not be captured alive in the corral there was only one alternative, that of hunting them with rifles. It was a poor alternative—for, if they were hunted, the deer would become wilder and probably could be killed only in remote sections of the island, far from the few roads; moreover, the natives of the Pribilofs were but haphazard riflemen, and there would be more deer wounded to die unfound than killed for food. The agent also considered driving the deer into ambush to have the hunters suddenly fire on them, but the thought of native marksmanship soon dispelled that idea—the object was to kill the deer, not the natives.

The reindeer of the islands *(Rangifer tarandus* L.) was the Siberian domesticated reindeer which the government imported to Alaska in the 1890's to help sustain the Eskimos of the Arctic. Twenty-five head had been brought to St. Paul in 1911. The first years they had been under active domestication, but as the herd grew larger they were released to run wild on the island. There were no enemies here and forage was good; the numbers increased rapidly. As the herd grew, more and

LEFT: *Reindeer corralled at Golovin, Alaska. In the excitement of the St. Paul roundup, no one was able—judging by the results—to take any usable photographs. (U. S. Fish and Wildlife Service, by W. P. Miller)*

RIGHT: *Handling reindeer at the end of a chute, Buckland River, Alaska. These pictures closely represent phases of the operation carried out on St. Paul Island in the Pribilofs, as described here. (U. S. Fish and Wildlife Service, by L. J. Palmer)*

more reindeer were killed under the supervision of the government agent, and their delectable meat played an increasingly large role in the diets of both whites and Aleuts in the Pribilofs.

The killing had been done carefully, and the herd still grew in numbers. Finally in the late 1930's it had reached such a size that there was not enough winter forage to sustain it. During the winter and spring of 1940-41 many of the herd had died either directly of starvation or from trying, in weakened condition, to face the winter storms; skeletons were in evidence all over the island.

Officials of the U. S. Fish and Wildlife Service had decided that conservation and utilization would best be served by reducing the herd from about two thousand to fifteen hundred animals. The meat of the slaughtered was to be put into cold storage and used over the entire winter.

Now they could not be captured. The established method had been tried. In October, when the reindeer were fat from their long season of feeding on the lush summer grass, beaters were sent out to drive them towards the corral. Driving the herd was easy if the beaters used tact. Three or four beaters would merely spread out a half mile or so apart and slowly walk in the direction of the herd, preferably down wind. The grazing animals would glance up, see the gradually approaching figures, and slowly, as they continued to graze, drift away from the oncoming men. The deer would follow the valleys where possible, and often one of the beaters would have to circle behind a hill, reappearing in a lateral valley, to prevent the herd from going the wrong way. But if the beaters became overanxious and approached the herd too closely, or moved too rapidly, or sprang upon it unexpectedly, the herd would take flight and resume its feeding miles away.

The corral for the capture of the reindeer was in a narrow valley between two rather steep small hills. Before it was a large rolling flat and behind it was another. Its mouth opened in the hourglass between the flats. The corral was in the form of a circle about one thousand yards in diameter with an eight-foot fence of horizontal slats for sides. One side of the circle was cut off to form a very wide opening; this opening was in turn flanked by wide wings that reached to the steep parts of the adjacent hills. It could be closed by means of a high movable fence carried into place, unit by unit, and set into concrete-lined postholes in the ground. Off the back side of the corral led gates to a concentration pen and a small killing pen.

Our theory of capture was simple. The reindeer were to be herded into the flat before the corral, then encouraged to enter the corral which itself was knee-deep in grass for their feeding. Natives, hidden from sight of the reindeer at the point where the wings joined the corral, would have a

temporary light rope fence. When the deer were in the corral, the gatesman would run across the entrance with the rope fence and hold the herd while the movable wooden fence was being put in position.

That was the theory. Now all the problem was to persuade the wild deer to enter and stand quietly within the corral while being fenced, or to fence them while they were charging out.

I think the saving idea occurred simultaneously to me and to the government storekeeper on the island. It was very simple: just extend the wings of the corral and have them encircle the herd when it was in the valley outside of the corral. Acting on the idea, we took two 2,000-foot coils of quarter-inch rope and tied one to each wing of the corral. We would have liked to have had a man stationed every hundred feet along the rope, to carry it and to frighten the reindeer, but as there were not enough men and boys in the village, we planned for a man every three hundred feet, and between them we tied burlap sacks that could be danced by jerking the rope. We were to lie hidden in the grass on the hillsides flanking the flat at the entrance of the corral, ready to spring up, run, and encircle the herd when it was in a favorable place. The idea was further improved by putting in a third two thousand feet of rope, manned as were the wing ropes, on the back side of a small knoll that terminated the flat beyond the mouth of the corral. This rope would enable us to close the mouth sooner.

Preparations completed, a dozen men were sent out to round up the various herds of reindeer. The herds were scattered, one at the far northeast corner of the island, another at the far northwest, with smaller herds between. It was several days before these herds reached the area near the corral, for the deer were so nervous they could be driven only with extreme care.

Finally the day of the roundup broke. Fortunately it was one of those most rare days on the Pribilof Islands when the wind was not blowing a gale, and the pallid sun, already low on the horizon, was not obscured by clouds. In short, it was a brisk fall day. School was dismissed, for every able male on the island over the age of ten was to help in the roundup; that included both the school boys and their teacher. Old grandfathers, weak and slow, were also enlisted.

The agent divided up the men into squads and put each squad under a captain. Ford Wilke had the rope and the squad at the right wing of the corral, I had the rope and the squad at the left wing; the school teacher and the storekeeper had the ends of the rope to the front of the corral; select men were put on the temporary gate of the corral. The dozen drivers had the herd of deer approaching the roundup site.

We carefully distributed our men along the ropes, with the youngest boys and the oldest men close to the corral where they would not have to run much, and the more vigorous young men out near the ends of the rope which were to swing the farthest. We tried to scatter the more intelligent men along the rope so they could set the example and direct the others. Our squads took their allotted positions on the hillsides. We hid as much as possible behind low grasses and the volcanic rocks of the hillside, lying quietly prone on the ground. The agent took a position high on the peak behind Wilke's line where he could better observe and direct operations.

Slowly the reindeer came into sight and moved down the valley. Over a thousand head—some had already escaped—were scattered over the view, grazing as they moved, their long brown and white coats making patterns in the pale sunlight. I looked at the two- and three-foot antlers and wondered if the reindeer would try to gore a man with them.

A half mile behind the herd was the semicircle of beaters, advancing slowly and conspicuously without sudden motions. Slowly the herd, grazing and glancing at the beaters, made its way into the large flat before the corral. One group, noticing the proximity to the corral's gates, suddenly broke and trotted away. We held our breaths, not knowing whether the herd would be infected momentarily with the restlessness and then the panic of the small group. But the latter merely trotted over to join the larger group, and resumed feeding. Finally all were concentrated in the flat, and the agent on the hillside signaled us to start our advance.

We on the ropes started to crawl towards the herd, far in the valley below, swinging the ropes from the wings of the corral to encircle the deer. We crawled as rapidly as we could over the boulder-strewn ground, keeping as much as possible to cover. I glanced out across the valley and saw the other two ropes also advancing, crawling as we did. As we crawled we realized we had a great distance to go before we could join ropes and that

St. Paul Village, Pribilof Islands, Alaska. It is the larger of two villages in the Pribilofs which are a government reservation managed by the Fish and Wildlife Service for the protection of the Alaska fur seal herd (about 2,900,000 animals in 1939) and huge flocks of gulls, murres, auklets, and other birds which nest on the islands. (U. S. Fish and Wildlife Service)

our speed was painfully slow. It was still satisfactory, though, for the deer were feeding and had not noticed us yet.

Suddenly the reindeer became aware something was wrong. Several bucks at the outside fringe of the herd stopped feeding and stared at us fixedly. We stopped. They trotted over to join the herd proper and we resumed our uncomfortable crawl. Other reindeer looked up and started to trot away, and this time several hundred animals followed them. They trotted towards the corral gates and then swung to come back. Other deer joined them and yet others. In a few moments the herd would begin to mill wildly.

The agent signaled us. We got up and ran to close the ropes. I will never forget that run. Each of the running reindeer in the valley was not a deer but an escaping aggregate of steaks, chops, and roasts. We had to capture them. The end of the other rope was still hundreds of yards away, down the hill and across a little valley. I ran down over the boulders, catching my feet in concealed holes, tripping, and falling headlong on the slippery grass-covered rocks. I would jump up and run on wildly, yet I could not keep ahead of the crew behind me. My three hundred feet of rope was dragging and catching on boulders. I suddenly realized that swinging the rope was like snapping the whip, with the man on the end—me—having to go the fastest and the farthest. My legs were long, but not that long; so, plunging ahead as fast as I could, leaping, slipping, falling down the hill, I began to coil the slack rope in my hands.

The reindeer now could see their encirclement. The two lines were swinging down the hills, the one line was advancing across the flat, and the beaters were running to help fill in the gaps. The herd milled in a circle and, wheeling like a flock of blackbirds into the corral, swept around its ring and charged out again towards the line coming across the flat.

We ran mightily. The sacks distributed along the rope danced with its jerking. The gaps were still large, and those doing less running near the wings were yelling frantically for us on the ends to hurry. The deer, in complete terror, were charging down upon us, a thousand head strong. We were on the smoother floor of the valley. We ran faster. As the deer approached, the gaps were still open. We tried to close them with our shouting and running.

Suddenly, like a school of minnows hit in the middle by a salmon, the herd split three ways. One group turned down the rope on my side back towards the corral. One group ran down the opposite side towards the corral. The third group, maybe five hundred animals in all, broke through the unclosed gap and galloped to freedom.

We saw that the planning of the ropes had been wrong, and the third line could not catch the two flanking lines in time. The knoll behind which that squad took cover was too far away; they had to go too far to reach us. So Ford Wilke and I started to run to each other, with almost a quarter of a mile separating us. The herd was circling the rope, and an occasional individual broke through the spaces between the men. Finally we met, bruised, battered, and breathless. There had been no more major losses of reindeer.

The plan previously made was to stop then and let the deer quiet down, finally driving them quietly into the corral. We stopped but the deer did not. By now the herd was broken into various small groups, a dozen animals in this one, forty or fifty in that one, milling excitedly around the enclosure. They ran, panting feverishly, around the edges and then across the middle of the enclosure. They would charge the rope, heads raised and antlers over their backs. Then men would jump, yell, and jerk the rope and the sacking to frighten the deer. The deer would continue in their mad gallop towards the rope, swerving a

scant ten feet from it, swerving as a body with each animal turning at the same time and in the same direction, and run off flank to flank.

In those brief moments when my line was not being charged I watched the action of others on the ropes. Ford Wilke was a well-built 180-pound man, hardened from his season's activity. Third man on his rope was the strongest Aleut in the village, a man almost Ford's size. But between them was a man small even for an Aleut, weighing, I suspected, around one hundred pounds. All three were leaning on the line, keeping it like a taut bowstring. A massive buck, huge antlers held back, tongue lolling from his mouth, breath white on the frosty air, came for the line, alone, galloping. Ford and the big Aleut leaned harder on the line and made the sacking dance between them. The buck, without pausing, dashed under the rope between the last sack and the little Aleut. The reindeer's head cleared the rope, but the branching antlers caught. Ford and the big Aleut instinctively threw all their weight and power into the rope, and the little Aleut clung tightly. The deer with his momentum and his fright ran on, rope notwithstanding. Ford and the big Aleut heaved mightily—and the rope slipped off the antlers. The little Aleut in the middle, snapped forward by the released bowstring of the rope, shot out in front like an arrow. He picked himself up and rather ruefully took his place again on the line.

At another place a group of reindeer charged a line. The man at that place danced his sacking vigorously. The deer swerved from the sacking which was jumping six feet in the air, and drove to the man who was standing relatively still. Like well-trained football linesmen blocking in a game, two big deer hit the Aleut, knocking him down. We held our breaths for others started to charge over his body. His partners on either side jerked on the rope frantically to pull it up and stop the herd from trampling over the prostrate man, but he was lying on the rope. As the Aleut lay prone with hands protecting his head, the group of a dozen deer ran over him, and then two more, larger, groups swung and joined them, all running near or over the body stretched on the grass. Other groups of deer across the enclosure were starting for the break, but there was a moment when there were no deer trampling on the man. He jumped up, bruised all over his body and cut on the hands from the sharp hoofs, but still game. He seized the rope and no more deer escaped there.

We could see that the deer were not quieting down, and that our rope was not adequate to hold them. So we started running again, to double our line. I ran for the opposite wing of the corral, and Ford ran for my wing. The third line was almost upon us and it too came up for reinforcements. The deer were wheeling and charging madly, and every few moments another ten or twenty of them would charge the line and escape over the steep hillside or across the valley.

The idea of tripling the line was a good one, but we did not quite anticipate what trouble we could have from three crews of men, all as excited as the reindeer, going in three directions in the same area. One man would find himself between two tight lines which were going in opposite directions. Or a group of deer would charge a line and as they carried one rope away with them for a distance, two or three men distant from the break would be knocked off their feet. Two men on one line would suddenly decide to tighten their line, and a third man of a different squad between them would be upset by the rope unexpectedly jerking up to his crotch.

Nevertheless, the maneuver was finally successful. As we stretched the ropes across the corral gates and untangled the men, the deer ran into the comparative quiet of the corral and stood in a close pack watching us. The gatesman ran across the opening with the rope gate. Our crews dropped their ropes and ran in with the big movable fence. The reindeer—those left, at least—were captured.

The deer were running again, around and around the circular fence, and we counted them as they passed us. We had more than two hundred —less than we desired but still enough for the winter's food.

The rest of the day was an anticlimax to the excitement of the roundup. The gate to the concentration pen was opened and the deer swept into it, thinking it was an avenue of escape. The gate was shut and individuals for slaughter were selected. The deer were roped over their antlers and dragged to the killing pen where the Aleut foreman would kill them with a bullet to the brain from a .22 caliber pistol. They were then skinned, butchered, and loaded on a truck to be taken to the village cold storage plant. The roundup was over.

"Mankind needs more than ever the healing value of contact with Nature in its sublimest forms, as exemplified by these Redwood forests."

In the Mary Glide Goethe Memorial Grove, Prairie Creek Redwoods State Park. (Moulin)

AUBREY DRURY

Saving the Redwoods

A CONTINUING PHASE OF "CONSERVATION IN ACTION" is the saving of the Redwoods. Just as the Save-the-Redwoods League has completed its thirtieth year, it finds itself faced with tasks formidable and challenging.

Finest Redwoods in Danger

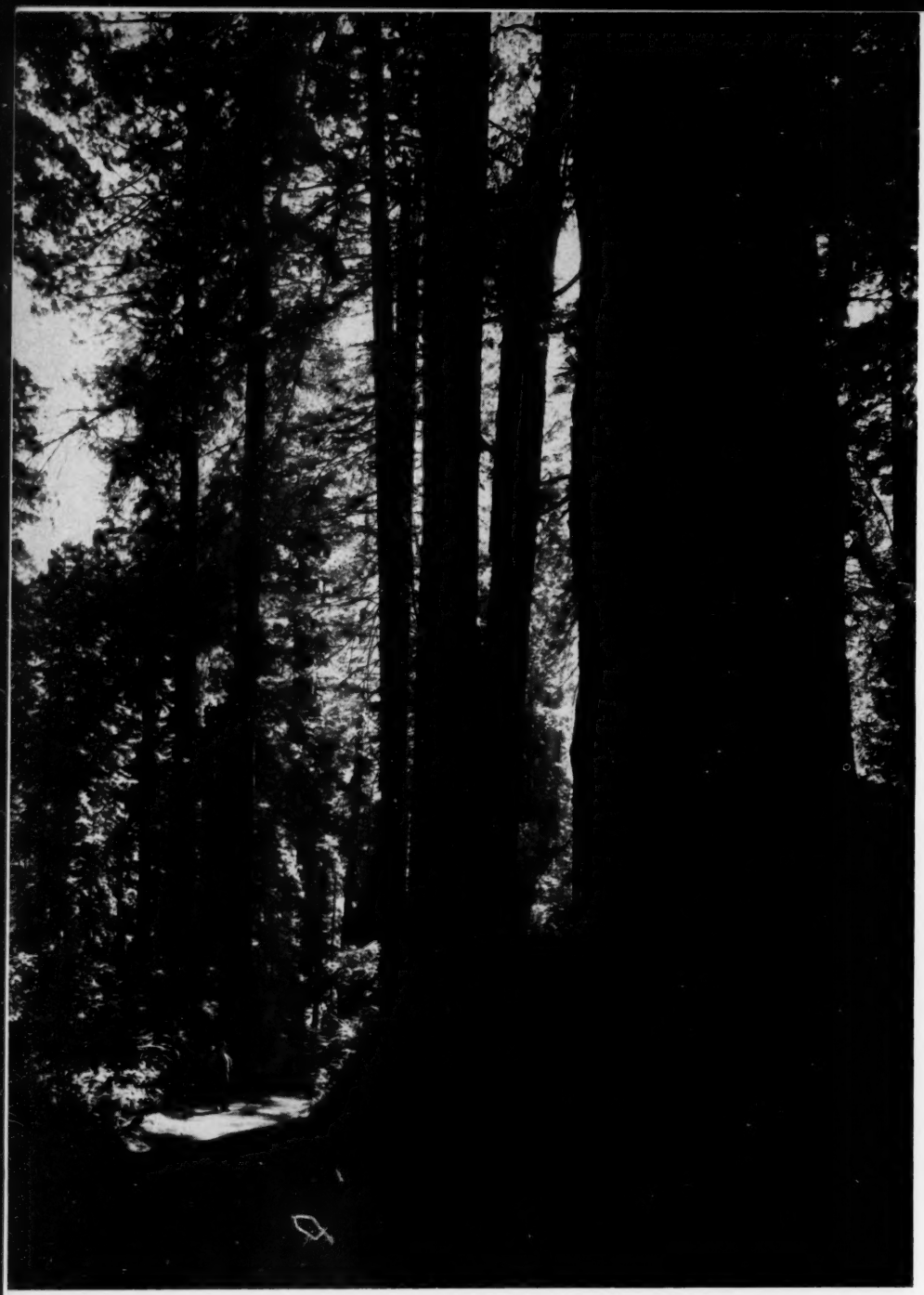
Some of the largest and oldest of the Redwoods remain in peril. Recent years have brought accelerated cutting. In Humboldt and Del Norte counties, in northwestern California, more than two hundred mills are turning out Redwood lumber, shakes, and shingles.

Facing this situation, confronting a major crisis in the Redwoods preservation movement, the Save-the-Redwoods League has considered itself obligated to increase its activity—to save, before it is too late, the finest of the Redwood forests directly in the path of lumbering operations. Forest areas are threatened suddenly with destruction which under supposedly "normal" conditions would not be approached by ax and saw for several years. The League has been impelled to urge the active aid of all who have at heart the salvation of the great Redwoods. Many of the Redwood trees now in danger are 2,000 years old and 350 feet high, among the tallest of all trees.

It has been hoped to preserve these outstanding forest areas in the Redwood State Parks, one-half the amount needed for their acquisition being contributed by the State, over the years, with the Save-the-Redwoods League raising the other half of the funds.

A Hundred Million Years of Redwoods

Redwoods—"living monuments of beauty"—are forest giants come down from very ancient times, as Dr. Ralph W. Chaney, noted paleobotanist of the University of California, has emphasized. They are members of "a race whose history is now known to extend back for a hundred million years into the past, to the days when dinosaurs roamed over the earth." The nearest relatives of our Californian Sequoias were thought to have become extinct some twenty million years ago. Then a Chinese forester, Tsang Wang, discovered the living tree—the "fossil come to life"—which is now famous as the Dawn Redwood. In a notable article



In the heart of the Madison Grant Forest and Elk Refuge, Prairie Creek Redwoods State Park. (Moulin)

in *Pacific Discovery,* Dr. Chaney* told of his journey into central China early last year to see *Metasequoia* in its home and to verify the botanical evidence of the leaf and seed specimens sent him.

The Save-the-Redwoods League sponsored this expedition by Dr. Chaney, chairman of its Committee on Education and Interpretation, and he at once took steps to secure Chinese government coöperation in efforts to preserve the limited stands of this only other known Redwood. Thus Dr. Chaney was able to advance conservation and

*"Redwoods Around the Pacific Basin," *Pacific Discovery,* September-October 1948.

science together—for the discovery of this living close relative of our Coast and Sierra Redwoods makes necessary a reëxamination of the botanical relationships of these great and vigorous survivors from the remote past.

An objective of the Save-the-Redwoods League is "to support reforestation and conservation of our forest areas." Dr. John C. Merriam, for twenty years president of the League, said:

"The League has recognized the economic values of the Redwood as of tremendous significance, and has carried out a program in which we attempted so to balance the requirements for science, recreation, education, and the inspiring values, as contrasted with the economic, that no phase would be studied without considering its relation to the others."

It is recognized that a considerable part of the Redwood forests will be devoted to lumbering. At present, the Redwood State Parks represent about 6 per cent of the total acreage of first-growth Redwood forest land in California.

The Founders

Of all known standing trees, the tallest is the toplofty Redwood—364 feet high—near the Dyerville Bridge. This monumental Sequoia, within Humboldt Redwoods State Park, is called the Founders Tree, in honor of the founders of the Save-the-Redwoods League. It stands in the Founders Grove, which commemorates them.

They were three eminent Americans—Madison Grant, Dr. Henry Fairfield Osborn, and Dr. John C. Merriam—who made a trip in 1917 into the heart of the Humboldt Redwoods. The first two of these were well known New Yorkers; the third, Dr. Merriam, a Californian, was long president of the Carnegie Institution of Washington. As a result of the devastation which they saw and foresaw, they decided to form the League and began a work of rescue in 1918.

Today the Save-the-Redwoods League has 15,500 members. Duncan McDuffie is President; Arthur E. Connick, Vice-President; and other members of the Board of Directors are Dr. Ralph W. Chaney, William E. Colby, Norman B. Livermore, Walter A. Starr, and Frank W. Wentworth. Dr. Robert Gordon Sproul is Treasurer.

National Tribute Grove

This year has marked the completion of the program for the establishment of the National Tribute Grove of ever-living Redwoods in honor of those who served in the armed forces of the United State in World War II. This preservation program has been carried on in collaboration with The Garden Club of America, the Daughters of the American Revolution, and the California State Park Commission. The National Tribute Grove, embracing more than 5,000 acres in the Smith River and Mill Creek region, Del Norte County, is only a few miles south of the Oregon boundary.

The dedication of trees and forests in honor of those who served has been declared most appro-

This kind of lumbering has reduced many thousands of acres of fine forest to desolate wasteland.

We must have lumber, but we can have it without destroying our greatest and most beautiful forests. Above all, we can prevent most fires, which leave us without either forest, lumber, or landscape beauty. (Moulin)

priate in a publication of the Arnold Arboretum of Harvard University. And Madison Grant spoke clearly the special fitness and lasting worth of this kind of memorial, in 1921 at the dedication of the Redwood grove in Humboldt County to the memory of the gallant Colonel Raynal C. Bolling. The American soldiers, Mr. Grant said, went to battle "for the one thing that men die for without hesitation—and that is their country.

"And what is their country? It is the inheritance that God gave us of forests and fields, of rivers and streams, of mountains and plains. They did not give their lives for a field of blackened stumps nor for rivers drained dry in summer or turned into sewers of factory waste. They gave theirs for a country that had trees on the hillsides, that had fish in the streams, that had birds in the air, that had feather and fur in the forest. Let us therefore resolve that we too shall continue the effort to preserve for those that come after us some portion of the heritage that was ours."

In the preservation of the Avenue of the Giants, as with other major projects of the Save-the-Redwoods League, the establishment of *memorial groves* through gifts by public spirited individuals and groups is proving very helpful. These groves are incorporated in the State Park system. Several additional memorial groves are in process of selection in these areas. Others are still available.

Not only are individuals commemorated. Organizations have participated in a notable way. One of the finest forests is The Garden Club of America Grove, on the South Fork of the Eel River. Others are the California Federation of Women's Clubs Grove, the Native Daughters of the Golden West Grove, the Soroptimist Grove, the Izaak Walton League Grove. A Rotary Memorial Grove is to be established.

Recently dedicated are the superb National Council of State Garden Clubs Grove and the adjoining California Garden Clubs Grove, traversed by the Redwood Highway in Prairie Creek Redwoods State Park, in northern Humboldt County.

Redwood forests southwest of Prairie Creek State Park are being purchased, as funds become available.

Elk Refuge in the Redwoods

A reserve of 1605 acres out of this park area, mostly in the Godwood Creek basin, has been designated as the Madison Grant Forest and Elk Refuge, as a memorial to Madison Grant.

Madison Grant (1865-1937), thus honored as one of the founders of the Save-the-Redwoods League, was a president of the New York Zoological Society, and took keen interest in the native herd of Roosevelt elk in the Prairie Creek and Godwood Creek region. Anthropologist and conservationist, he was known also for his writings, including

Overlooking The Garden Club of America Grove, Canoe Creek Basin, from Grasshopper Ridge. (Moulin)

(All photographs courtesy the Save-the-Redwoods League)

several notable books in the field of ethnology.

Included in this reserve are some of the meadowlands or prairielands – Boyes Prairie or Elk Prairie—where the herd of elk is now accustomed to browse. The Redwood Highway traverses the prairie.

Of this native elk, Dr. Robert C. Miller wrote in the *Academy News Letter* (No. 61, January 1945), monthly news bulletin of the California Academy of Sciences: "It formerly ranged along the California coast as far south as Marin County. . . . This splendid animal, known variously as the Roosevelt Elk or Wapiti, Olympic Elk, or Humboldt Elk, is the largest and most magnificent of all elk. It differs from the common Canadian or Rocky Mountain Wapiti in several respects, the most important of which are its larger size, broader and more massive skull, and darker coloration."

Contributions by individuals and organizations made possible the Madison Grant memorial—De-Forest Grant, John D. Rockefeller, Jr., Archer M. Huntington, New York Zoological Society, Boone and Crockett Club, National Audubon Society, American Wildlife Foundation, Save - the - Redwoods League, California State Park Commission. A bronze tablet marking the wilderness area has been placed on a massive granite boulder, with a Redwood forest background, in the Elk Prairie.

Acquisition and Appreciation

The Redwood forests, offering scientific interest, inspiration, and recreation, are purchased as the funds are raised, in successive units.

The Save-the-Redwoods League has consistently aided in safeguarding the State Parks, and particularly the primeval Redwood reserves, against exploitation, against possibly destructive highway development, against danger from fire and vandalism. The incursion of logging roads into the Parks is being resisted.

Acquisition is one important factor; appreciation and wise use are others, which the practical conservators have regarded as vital.

Sustained study is under way to determine and interpret the highest values of the Redwoods. Dissemination of authentic information about these great trees, particularly from the esthetic and scientific viewpoints, is an important part of the activity of the Save-the-Redwoods League.

The League issues a series of illustrated pamphlets by well known scientists. These include: *Trees, Shrubs and Flowers of the Redwood Region,* by Willis L. Jepson; *A Living Link in History,* by John C. Merriam; *Redwoods of the Past,* by Ralph W. Chaney; *The Story Told by a Fallen Redwood,* by Emanuel Fritz.

It is realized that better understanding of the

Roosevelt elk in the Madison Grant Forest and Elk Refuge. (Moulin)

BIOLOGY: ITS HUMAN IMPLICATIONS. By Garrett Hardin. W. H. Freeman and Company, San Francisco. 1949. 635 pp., 303 illus. $5.00.

There are two ways to review textbooks of this character. One is to dig out a few errors, thus demonstrating the reviewer's superior knowledge. The other is to evaluate the book in terms of what it tries to accomplish. When viewed from the point of view of an instructor in search of a suitable text, this sometimes becomes a difficult matter, since each instructor has his own conception of what should be included in a general biology course designed for students who plan to take no more of the subject than this one course, and how the course should be presented. Dr. Hardin, who is an assistant professor of biology in the University of California (Santa Barbara), has some definite ideas, which are summarized in his subtitle, and serve as the integrating force in his textbook.

It is true that many students do not profit from the old style presentation of biology as a gathering of facts about the basic principles of life and details about such animals as Paramecium and the frog. This text, with its reiterated comparisons to human anatomy, physiology, and problems, will undoubtedly serve to make biology a more interesting subject for such students. Now and then this effort to "humanize" the subject results in somewhat lively terms of expression, such as "the getting together of sperm and egg" for fertilization, and the statement that genuine silk is a good substitute for rayon and nylon. Occasionally a statement is too loose for comfort, but that is true of any text. Some of the diagrams, especially of Crustacea and amphioxus, are carelessly done, and one in particular, that of the musculature of the crab claw, is altogether inaccurate. Such details as these will undoubtedly be rectified in future editions.

From this reviewer's point of view, more could be said on conservation, especially in elucidation of basic ecological principles, and population dynamics of the human species should be discussed at greater length. Also, the vast field of marine biology is virtually untouched. This is especially striking in the brief section on fossil life, where the point that the earliest fossils were marine is not brought out. Such matters can of course be brought out in lectures, but the printed word still carries more weight for most students.

The book is provided with chapter bibliographies, sample questions, and an index, and except for the points mentioned, covers the broad field of general biology adequately, with perhaps a little more material on genetics than is usually given in such texts.

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THE COAST OF NORTHEAST GREENLAND, WITH HYDROGRAPHIC STUDIES IN THE GREENLAND SEA. By Louise A. Boyd, with contributions by Richard Foster Flint, James M. LeRoy, Henry J. Oosting, Fred A. Buhler, F. Eyolf Bronner, A. J. Hilferty, Alice Eastwood, and the United States Coast and Geodetic Survey. *Special Publication No. 30,* American Geographical Society, New York. 1948. xii + 339 pp.; 161 photographs, 25 maps, 17 diagrams in the text; slipcase with 10 maps, 29 echo sounding profiles, 12 photographic panoramas. $6.00.

This important publication of the American Geographical Society is a comprehensive assembly of data concerning the east coast of Greenland and adjacent islands obtained on several expeditions (especially those of 1937 and 1938) organized and financed by Louise A. Boyd, who also took most of the photographs that give this volume such value. Never before have photographs so numerous and of such excellence been taken of these regions, illustrating as they do features that could be recorded in no other way and are most important for mapping.

The ship *Veslekari* which she chartered for the voyages of 1937 and 1938 was the same ship that had been chartered in 1933 so that the knowledge gained by officers and crew made for greater efficiency. The captain was Johan Olsen, the engineer Peter Strand. The scientific staff consisted of a geologist, botanist, hydrographer, topographer, radio operator, and Miss Boyd, leader and official photographer. All photographs were taken by her except some in the geologists' report, which were taken by A. L. Washburn, the assistant geologist.

In reviewing this book I have been impressed by the great executive ability of Miss Boyd, her enthusiasm, her foresight, thoroughness, long range planning, and her endurance. The coöperative spirit that seemed to prevail showed great tact and real fellowship. Miss Boyd not only had the means to accomplish her ambitious expeditions, but she was animated by a sin-

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human values of the Redwood forests, unique heritage of the nation, will strengthen the cause of saving and safeguarding these primitive woodlands.

As Dr. John C. Merriam said, "Mankind needs more than ever the healing value of contact with Nature in its sublimest forms, as exemplified by these Redwood forests."

cere desire to contribute something really valuable to our knowledge of the coast of Greenland. This report was ready to be published before World War II but could not be, as the data which were so useful to the United States would be equally so to the enemy.

A foreword at the beginning of the book by Edward H. Smith, Rear Admiral, U. S. Coast Guard, tells of the value of the knowledge gained from this and previous expeditions. Miss Boyd and her staff were exceedingly coöperative and helpful, and of great assistance in navigating these little-known ice-infested waters. He congratulates Miss Boyd and expresses his great admiration.

The publication begins with the narrative by Miss Boyd taken from her diary which recorded the events as they occurred. Before starting on the account of the 1937-38 voyage she reviews preceding expeditions. In 1924 as a tourist, she visited Spitzbergen in a Norwegian tourist ship and saw the great ice packs on the coast. She was inspired to photograph these great masses of ice in all their varied aspects, as well as the picturesque fiords.

In 1925 she chartered the *Hobby*, a Norwegian sealer, and sailed to the west coast of Spitzbergen and Franz Josef Island, going into the pack ice and taking many photographs. In 1928 the *Hobby* was again chartered but the purpose of the expedition was changed to the search for Amundsen. One thousand miles of arctic sea were traversed, and photographs were taken, chiefly from the ship.

In 1931 the first expedition to the east shores of Greenland was organized, primarily for the purpose of photographing and examining every inlet and sound in the area of the Franz Josef and King Oscar sounds. Several thousands of photographs were taken, including a series covering a previously unsuspected connection between Kjerulf and Dickson fiords. From these photographs the American Geographical Society made a large scale map which by older cartographic methods would have taken years in the time permitted in the short summer, and under the difficulties and dangers of travel due to the nature of the region. This expedition first penetrated the ice fiords and discovered the De Greer Glacier.

This expedition may be looked upon, in Miss Boyd's opinion, as a reconnaissance, on the basis of which the plans for subsequent expeditions were made. In her own words: "It aroused in me a desire not only to continue until I had seen all of the region that is ordinarily accessible by ship and to record it with the camera as well and as thoroughly as possible, but also to do what I could to add to the knowledge that everywhere seemed to call for scientific investigation. Also I gained the familiarity with weather and all conditions that is necessary if an expedition is to be so planned and equipped that there is good prospect of achieving its objectives during the all-too-brief summer months when the chances of a ship getting through the coastal ice belt and out again are reasonably favorable."

The second Greenland expedition in 1933 was organized with the coöperation of the American Geographical Society as a well-staffed and well-equipped scientific expedition. The primary purpose was the study of glacial marginal features particularly in the area of the Franz Josef and King Oscar fiords. The staff included a surveyor and an assistant surveyor, a physiographer, a geologist, and Miss Boyd herself as leader and photographer. A botanist was also included but he developed appendicitis on the way out and returned on a Norwegian whaler which fortunately happened to be in the vicinity. Nevertheless some botanical collecting was done; Miss Boyd and another member of the party collected 80 vascular plants at 13 different stations. The accounts of these different expeditions were published in a special publication of the American Geographical Society.

The outfitting for the expedition of 1937 was done as before, at Alesund, Norway. Messrs. LeRoy and Buhler joined Miss Boyd there and helped with the loading of the ship. June 1 the ship was ready to sail for Tromsö where the other members of the staff were to join them.

After some delay while a new echo sounding machine was being installed, the course was set for Jan

Mayen Island. Heavy seas were encountered which swept over the deck even into the mess hall so that high rubber boots were necessary. These boots were often needed also to wade ashore. The echo sounding machine was of great value; but after learning that the Norwegian ship *Polarbjörn* had run its bow hard aground in Young Sound while still over deep water amidships, Captain Olsen took the added precaution of letting the anchor chain dangle well below the ship's bow when in any doubt as to the depth of the water. Thus the chain would hit bottom first and slacken in sufficient time for the ship to be stopped before going aground.

The geologist of the 1937 expedition was Dr. Richard Foster Flint. His report included not only the geology but also the geomorphology; it is a long article of 129 pages, eight maps and charts, and illustrated by 42 photographs, including three magnificent panoramas filling two pages. All except some taken by A. L. Washburn, the assistant geologist, were taken by Miss Boyd, who accompanied the geologists over ice packs, land elevations, and very rough terrain. She photographed the features that were needed for explanation and illustration.

On the 1938 expedition the geologist was F. Eyolf Bronner. Owing to the hydrographic emphasis of the expedition it was not found possible to follow a systematic geological plan. Local geology was studied and recorded wherever landings were made, and from the photographs taken by Miss Boyd a map was made by James LeRoy, the hydrographer. The topographical report was written by Fred W. Buhler. On the Ile de France the farthest north was reached, a feat probably not surpassed by any previous explorers.

The report of the hydrographer James L. LeRoy was most important. In order to record depths, soundings were taken and recorded night and day in watches by crew members and scientists. Mr. LeRoy also made the magnetic observations and looked after the recording of the currents and tides. At Miss Boyd's request the U. S. Coast and Geodetic Survey reported on the findings.

Since it was important for the study of glacial recession to obtain knowledge of the plant communities associated with the recessional features, a botanist, Dr. Henry J. Oosting, accompanied the 1937 expedition. His report is entitled "Ecological notes on the Flora." The report begins with an historical review of what has been done by collectors over 100 years, the localities favorable for such collections, the time limit, and other factors. A table of the flowering plants was made on which the plants were arranged in alphabetical order under the following heads: outer coast region, inner coast region, outer fiord region, inner fiord region. The entire flora is now quite well known; 109 species of flowering plants, 2 ferns, 18 hepatics, 47 mosses, and 14 lichens were collected.

On the 1938 expedition no professional botanist was on board so Miss Boyd did all the plant collecting, and the plants were subsequently named and arranged in a chart by Alice Eastwood. In all expeditions previous to that of 1933 all collecting was done by Miss Boyd. Her method of collecting was unique, ingenious, and scientific. As no time could be taken for pressing plants as collected and a vasculum was inadequate and cumbersome, a rucksack was made which could be carried on the back. Each collection with all the scientific data on a card was just put into a bandanna or a piece of cotton cloth of the same shape, then tied by the four corners and deposited in the sack. When it became full, as often happened, these were fastened on to belts or clothes. After the arduous travel of the day Miss Boyd's duties were not finished and often her labors extended into the "wee small hours" as she arranged each collection in sheets of paper with the data, and put them in presses with absorbent driers.

Musk oxen were often seen. When with the herds the bulls are not dangerous but a solitary bull is to be feared. Several times members of the expedition were in danger from a belligerent onslaught, and once the danger was so imminent that the bull had to be shot. Polar bears were seen on the ice but only once on land; beautiful photographs of them were obtained. Walruses were seen and photographed lying on the ice.

The care of the camera was a continual task. Danger of sand filtering in and scratching the lens was prevented by a meticulous cleaning every night. How Miss Boyd managed all these after an arduous day in the field is extraordinary. Her endurance was remarkable. Her diary, too, had to be recorded each day.

In all Arctic expeditions the risk is great. Miss Boyd had chartered stout ships with able officers and crew and installed every device for safety. Nevertheless, at one time they were in great danger of being crushed by the ice or trapped for the winter. All hands, including scientific staff, worked under direction of the able captain and at length they escaped to open sea.

Throughout the narrative of the voyages the feeling inspired by the grandeur and sublimity of the scenery is communicated by Miss Boyd to the reader, and is enhanced by her remarkable photographs. No review can do justice to the volume from this standpoint. Even while the vessel was in the most dangerous situations Miss Boyd apparently had no thought of danger. Her confidence in the stout ship, the able officers and the devoted crew was unbounded. A fine feeling of comradeship and coöperation seemed to prevail. The scientists were enthusiasts, each in his special field, and must have considered the opportunities of the greatest value.

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